CESM Unified Postprocess ing and Diagnostics (CUPiD)

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- **TSS:** Sam Levis, Will Wieder, Sam Rabin, Meg Fowler, Naoki Mizukami
- **Students/Interns:** Ingrid Carlson, Cameron Cummins, Shivani Kumar, Hilary Lam

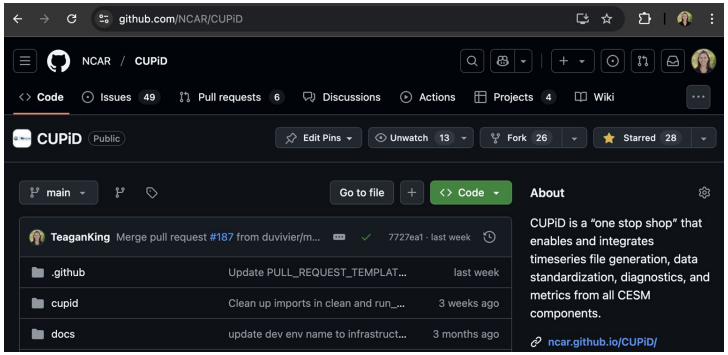
CUPiD Project Vision

CUPiD is a “one stop shop” that enables and integrates timeseries file generation, data standardization, diagnostics, and metrics from all CESM components.

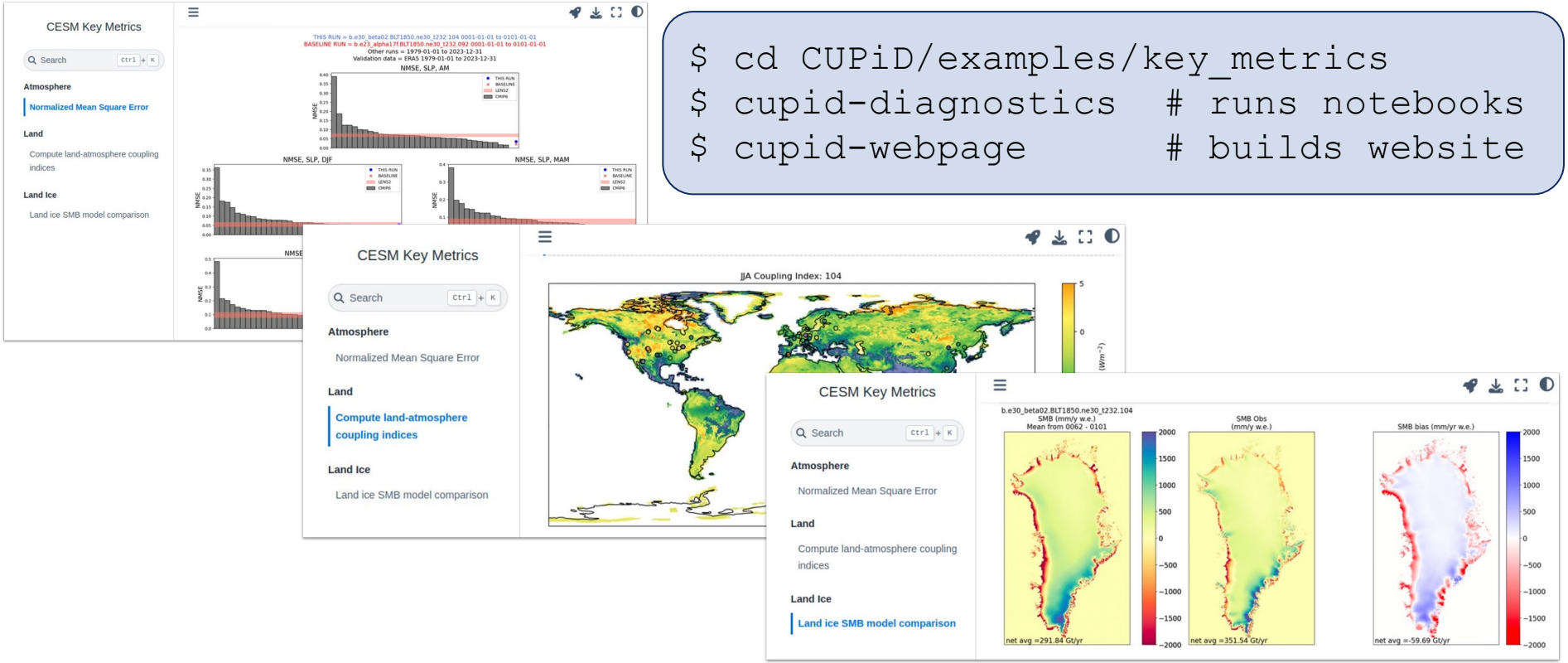
This collaborative effort aims to simplify the user experience of running diagnostics by calling post-processing tools directly from CUPiD, running all component diagnostics from the same tool as either part of the CIME workflow or independently, and sharing python code and a standard conda environment across components.

Current Status

- [x] Key metrics for most components which can run in parallel
- [x] External diagnostic packages
- [x] Command line arguments
- [x] Common environment
- [x] Documentation
- [ ] Part of CESM Workflow
- [ ] Support for machines other than Casper / Derecho



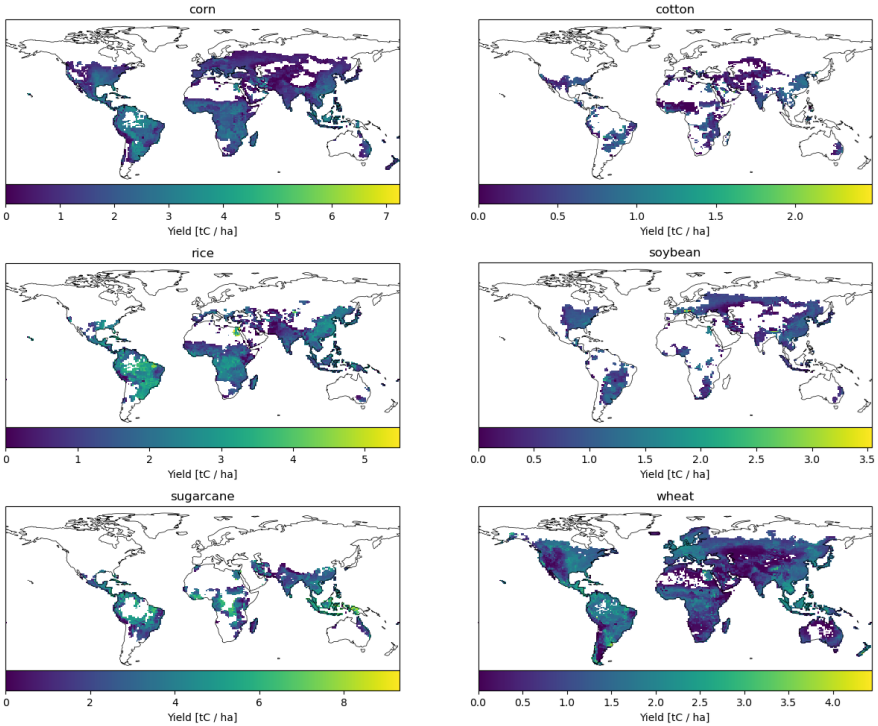
How Can I Use CUPiD?

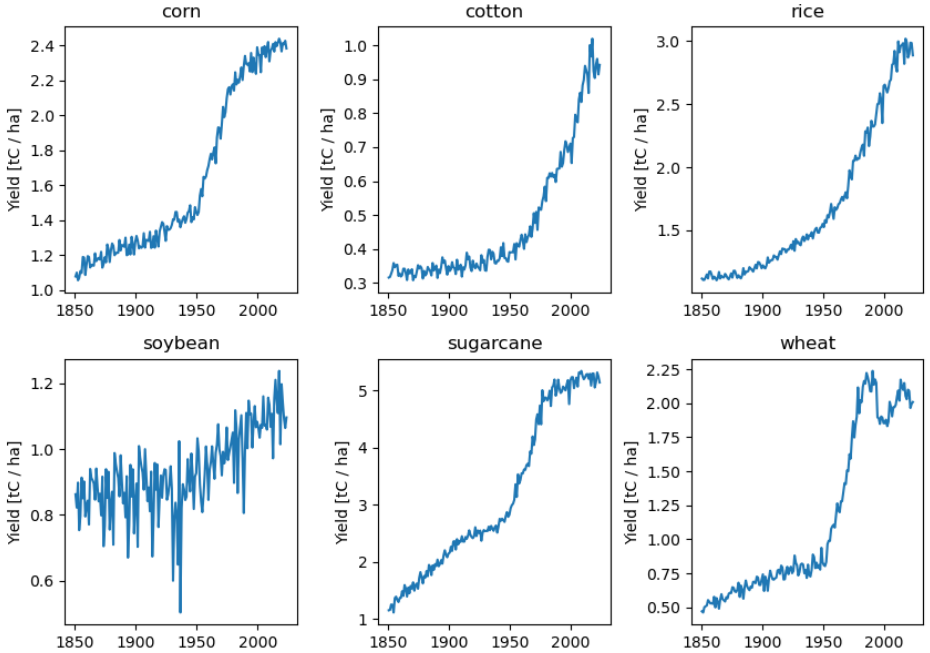



```
$ cd CUPiD/examples/key_metrics
$ cupid-diagnostics  # runs notebooks
$ cupid-webpage      # builds website
```

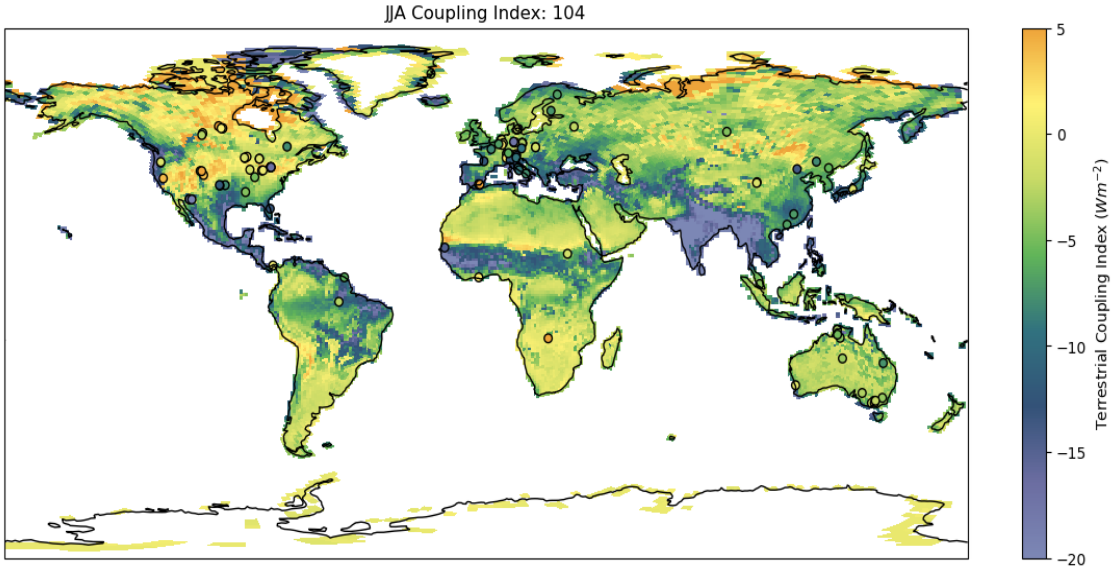
Land Success Story #1: Crop Notebook by Sam Rabin

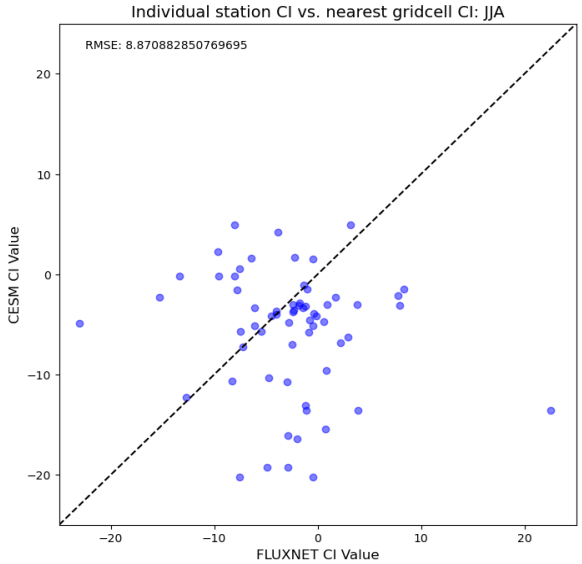
Concept: Proved! Sam got CUPiD running and his own notebook was integrated within a few hours of work on Day 1 of the SEWG hackathon!





Land Success Story #2: Key Metric - Global Terrestrial Coupling Index by Meg Fowler

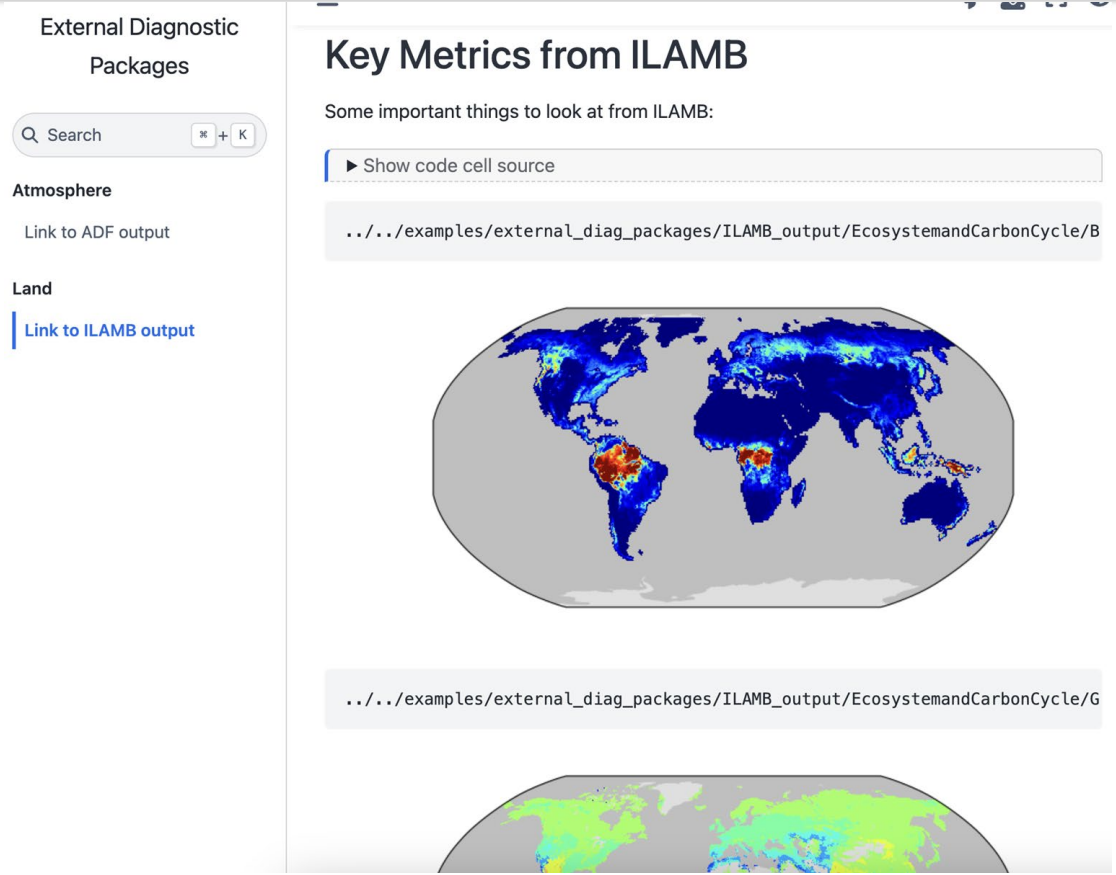




- Compute land-atmosphere coupling index
- Plot seasonal means
- Compare with FLUXNET observations

Land Success Story #3: ILAMB Integration

- ILAMB is part of CUPiD analysis environment
- Scripts generates configuration files for ILAMB
- Can run ILAMB and view results as part of CUPiD



How Can I Use ILAMB in CUPiD?

How to run ILAMB by hand (will be automated in CESM Workflow)

```
$ conda activate cupid-analysis
$ export ILAMB_ROOT=<PATH>/ilamb_aux
$ ilamb-run --config <PATH>/ilamb_nohoff_final_CLM_BGC.cfg --build_dir
<PATH>/ILAMB_output/ --df_errs <PATH>/quantiles_Whittaker_cmip5v6.parquet --
define_regions <PATH>/LandRegions.nc <PATH>/Whittaker.nc --regions global --
model_setup <PATH>/model_setup.txt --filter .clm2.h0.
```

CUPiD can provide the necessary input files for ILAMB

```
$ cd CUPiD/helper_scripts
$ ./generate_ilamb_config_files.py --cesm-root $CESM_ROOT --cupid-config-loc
../examples/external_diag_packages --run-type [SP|BGC]
```

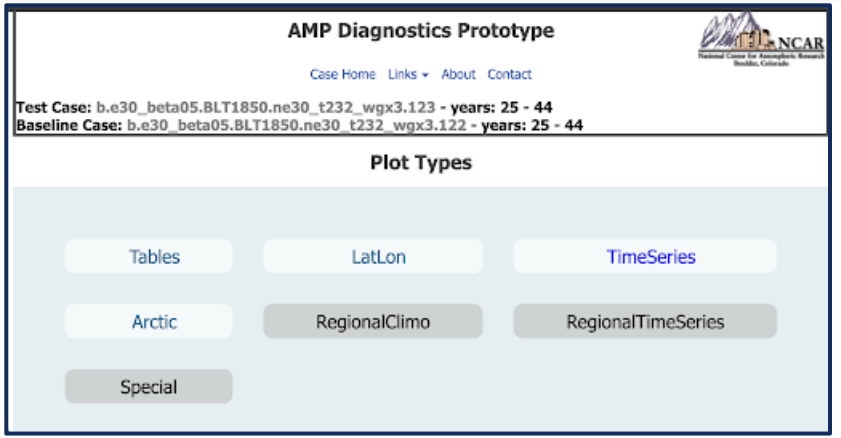
Run CUPiD and look at ILAMB output [see top box]

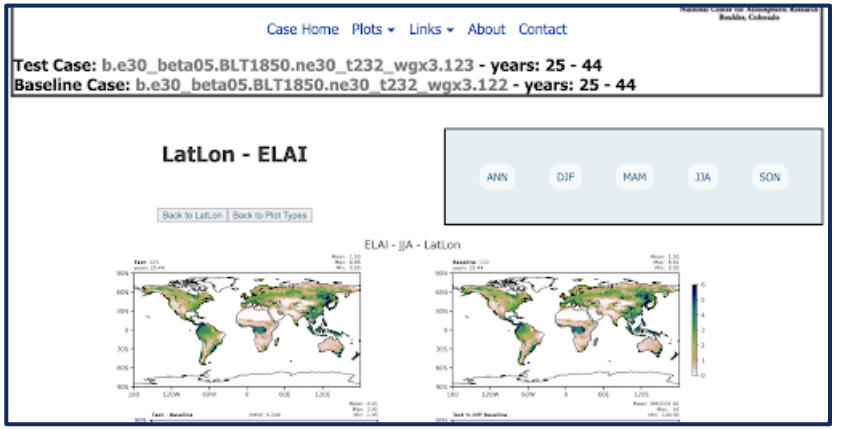
```
$ cd examples/external_diag_packages
$ [run ILAMB]
$ conda activate cupid-infrastructure
$ cupid-diagnostics --land
$ cupid-webpage
```

Land Success Story #4: “LDF” by Will Wieder & Sam Levis

End-to-end workflow for land diagnostics using ADF:

- Create single variable time series and climatologies
- Regrid ne30 data to f09
- Calculate tables of global sums
- Global maps of annual & seasonal means (using raw ne30 data)
- Make web pages





Contributing to CUPiD

- Do you want to add easily accessible diagnostic notebooks to CUPiD?
  - Check out our contributing notebooks guide
  - Add to our repository using this workflow

- If you come across issues or envision new features:
  - Contribute code
  - Create a GitHub issue ticket